FIG. 1

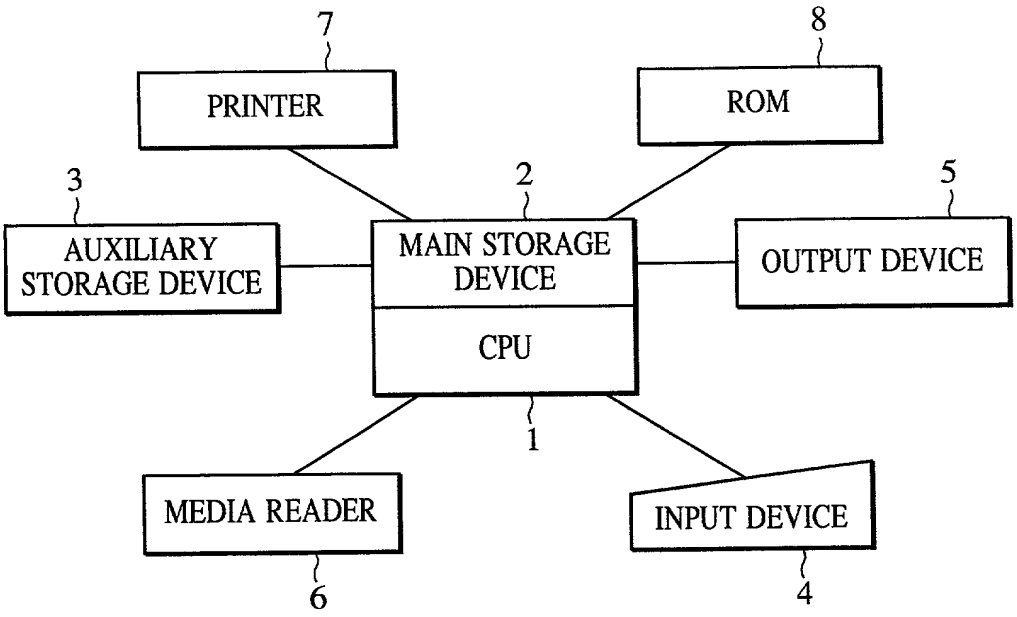

7
PRINTER
8
ROM
3
AUXILIARY STORAGE DEVICE
2
MAIN STORAGE DEVICE
CPU
1
5
OUTPUT DEVICE
MEDIA READER
6
INPUT DEVICE
4

FIG. 2

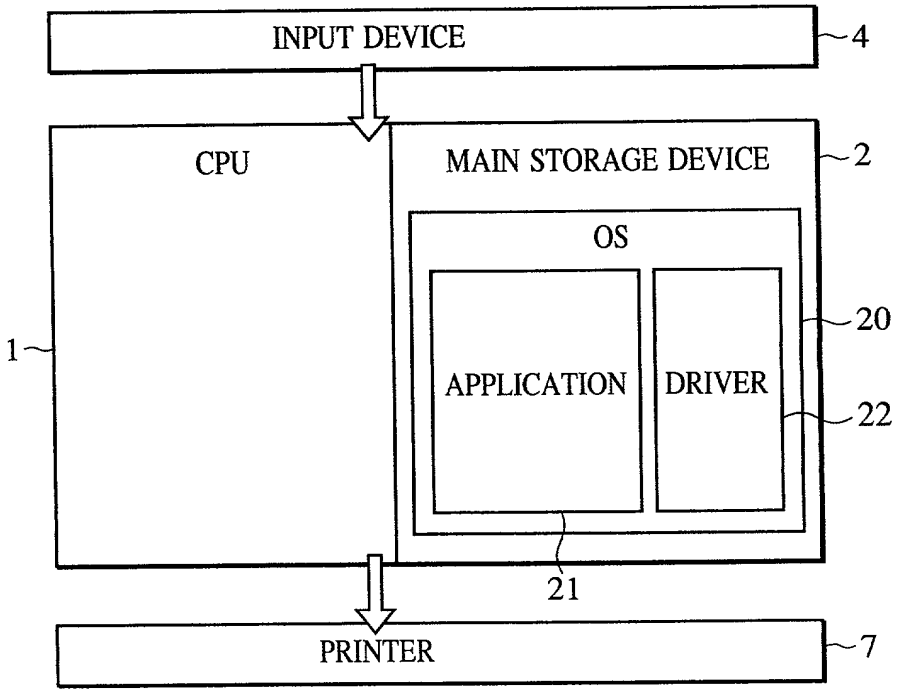

INPUT DEVICE
4
CPU
MAIN STORAGE DEVICE
2
OS
APPLICATION
DRIVER
20
22
1
21
PRINTER
7

FIG. 3

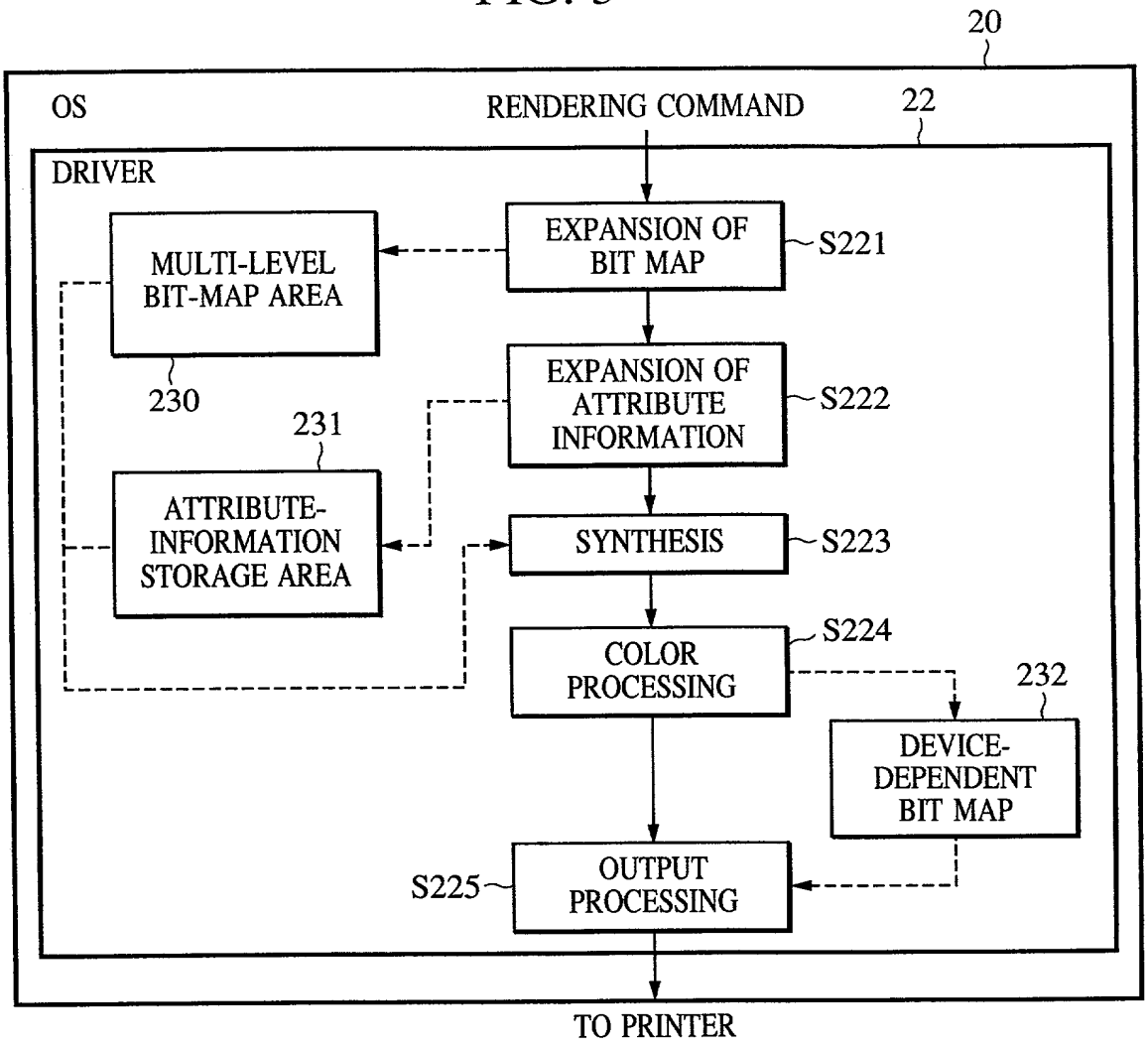

20
OS
RENDERING COMMAND
22
DRIVER
EXPANSION OF BIT MAP
S221
MULTI-LEVEL BIT-MAP AREA
230
EXPANSION OF ATTRIBUTE INFORMATION
S222
231
ATTRIBUTE-INFORMATION STORAGE AREA
SYNTHESIS
S223
S224
COLOR PROCESSING
232
DEVICE-DEPENDENT BIT MAP
S225
OUTPUT PROCESSING
TO PRINTER

FIG. 4

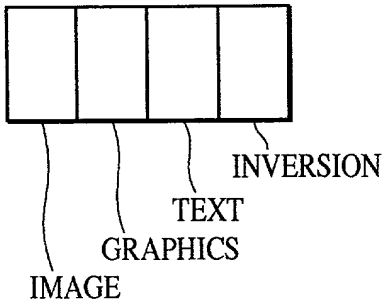

INVERSION
TEXT
GRAPHICS
IMAGE

FIG. 5

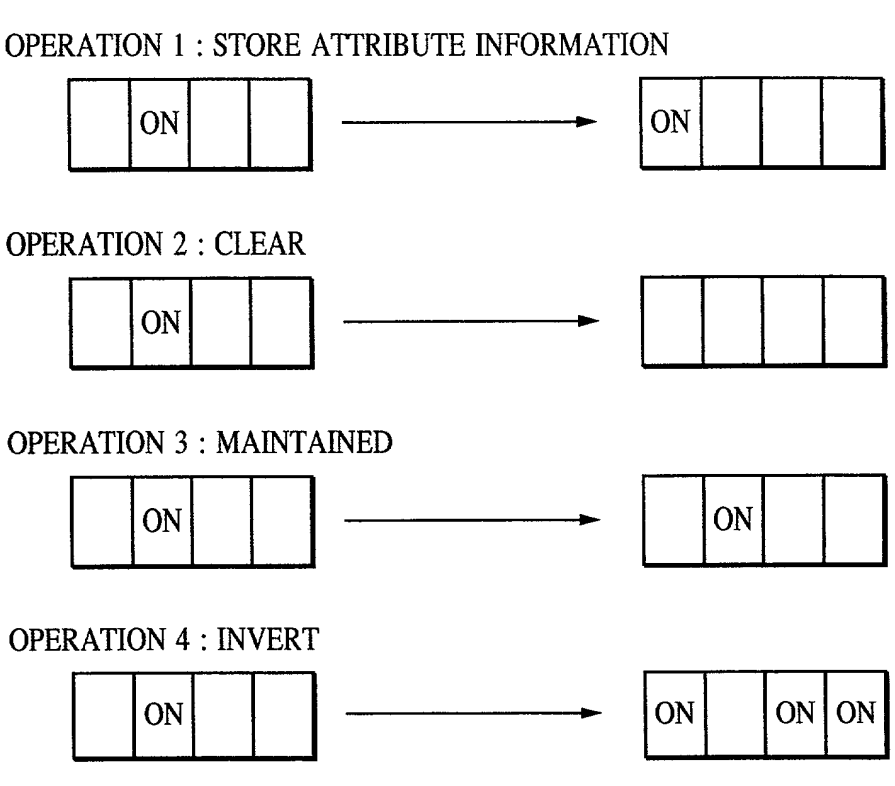


FIG. 6

PATTERN	SOURCE	DEST	RESULT	SOURCE COPY	PATTERN COPY
0	0	0	r000(0 or 1)	0	0
0	0	1	r001(0 or 1)	0	0
0	1	0	r010(0 or 1)	1	0
0	1	1	r011(0 or 1)	1	0
1	0	0	r100(0 or 1)	0	1
1	0	1	r101(0 or 1)	0	1
1	1	0	r110(0 or 1)	1	1
1	1	1	r111(0 or 1)	1	1

FIG. 7A

SOURCE	DEST	RESULT
0	0	r000
0	1	r001
1	0	r010
1	1	r011

FIG. 7B

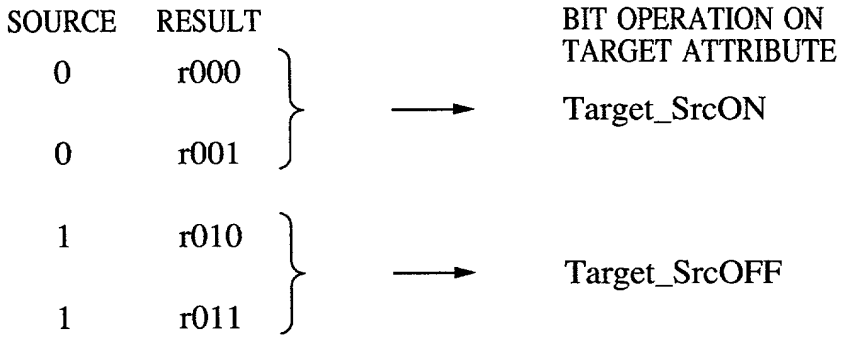


FIG. 7C

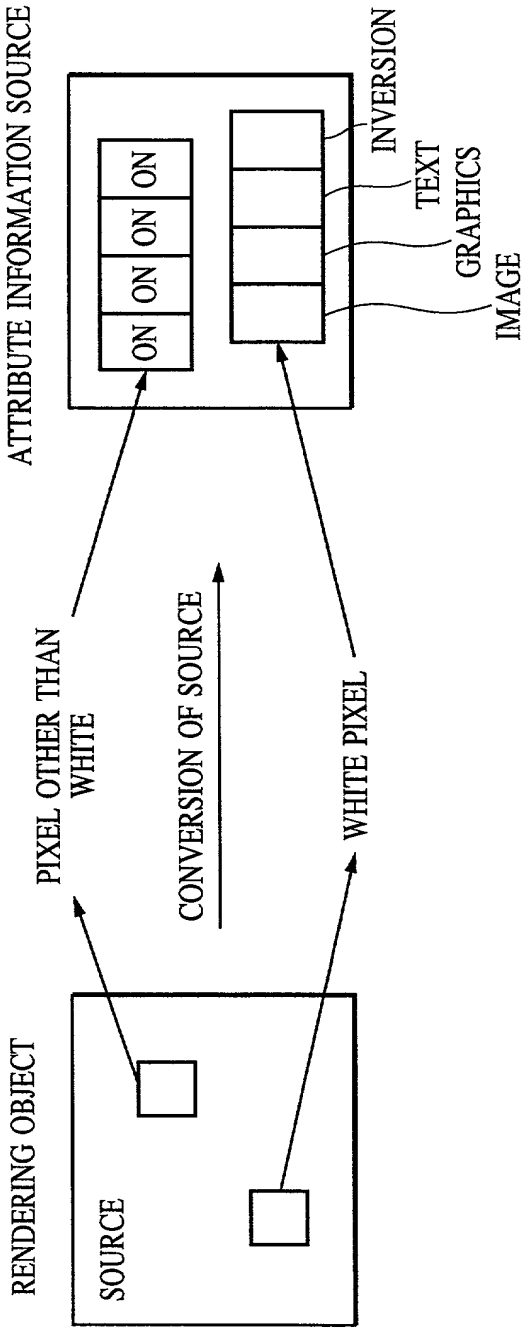

ATTRIBUTE INFORMATION SOURCE
ON
ON
ON
ON
INVERSION
TEXT
GRAPHICS
IMAGE
PIXEL OTHER THAN WHITE
CONVERSION OF SOURCE
WHITE PIXEL
RENDERING OBJECT
SOURCE

FIG. 7D

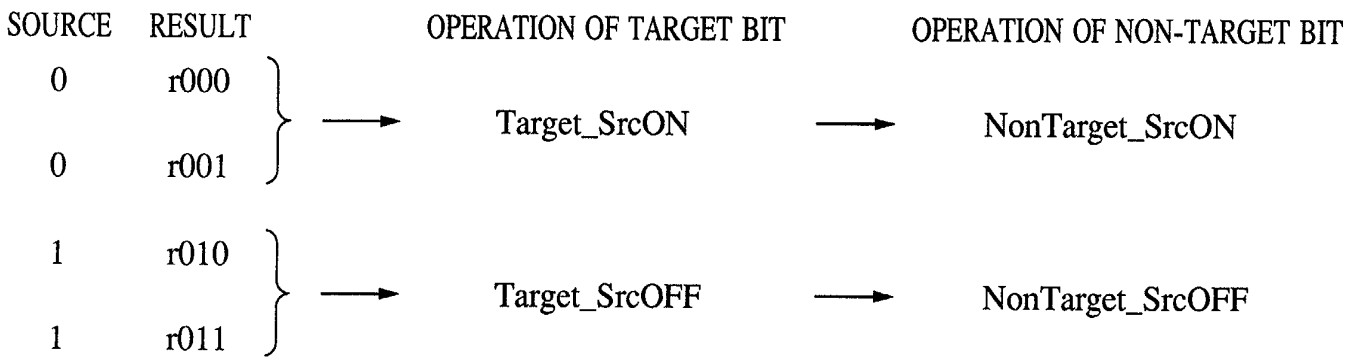

SOURCE
RESULT
OPERATION OF TARGET BIT
OPERATION OF NON-TARGET BIT
0
r000
0
r001
Target_SrcON
NonTarget_SrcON
1
r010
1
r011
Target_SrcOFF
NonTarget_SrcOFF

FIG. 8A

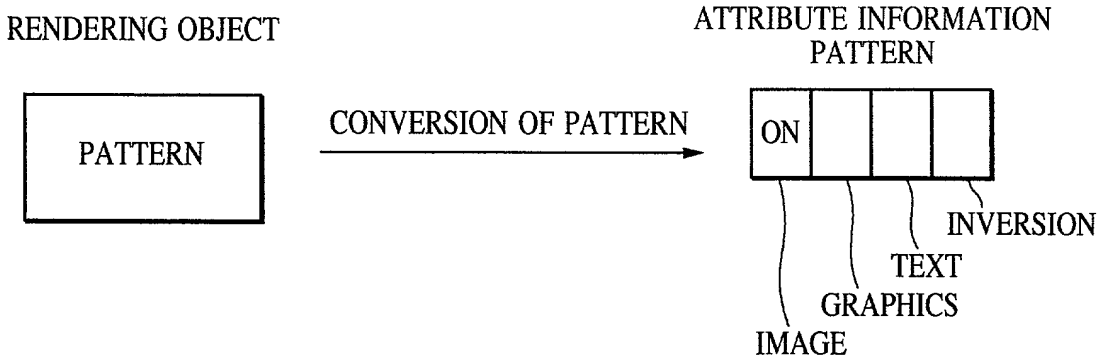


FIG. 8B

ATTRIBUTE INFORMATION PATTERN	ATTRIBUTE INFORMATION SOURCE	ATTRIBUTE-INFORMATION STORAGE AREA	RESULT	
OFF	OFF	OFF	OFF or ON	NonTarget_SrcOFF
OFF	OFF	ON	OFF or ON	
OFF	ON	OFF	OFF or ON	NonTarget_SrcON
OFF	ON	ON	OFF or ON	
ON	OFF	OFF	OFF or ON	Target_SrcOFF
ON	OFF	ON	OFF or ON	
ON	ON	OFF	OFF or ON	Target_SrcON
ON	ON	ON	OFF or ON	

FIG. 8C

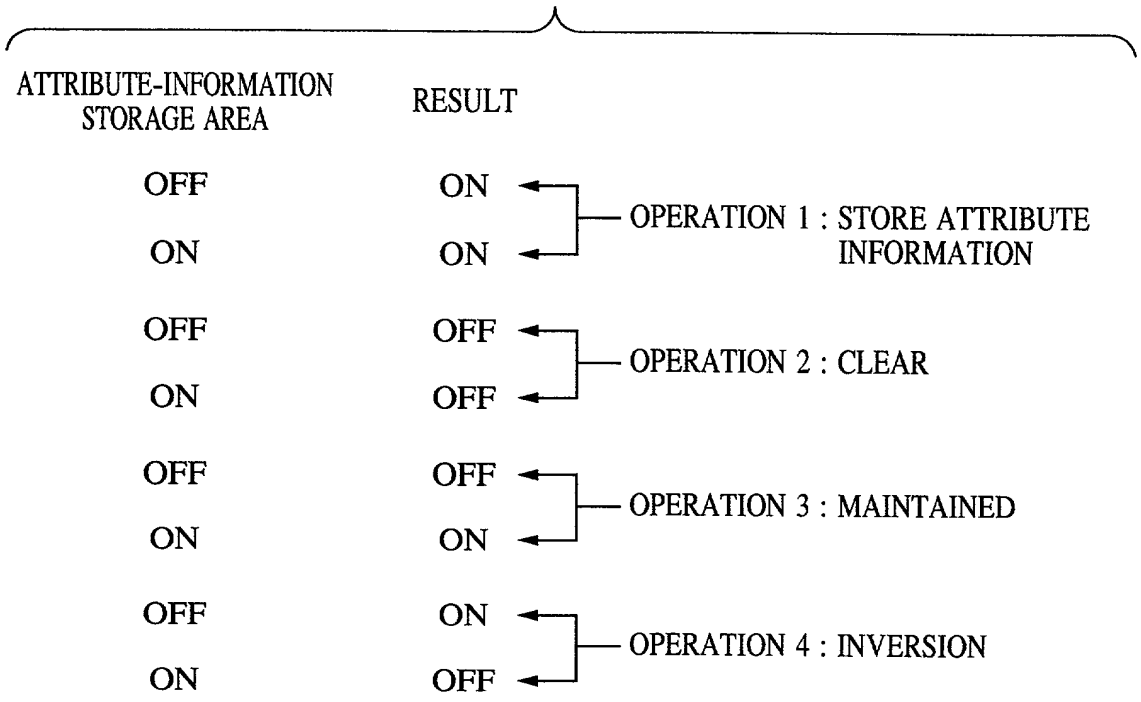

ATTRIBUTE-INFORMATION STORAGE AREA
RESULT
OFF
ON
ON
ON
OPERATION 1 : STORE ATTRIBUTE INFORMATION
OFF
ON
OFF
OFF
OPERATION 2 : CLEAR
OFF
ON
OFF
ON
OPERATION 3 : MAINTAINED
OFF
ON
ON
OFF
OPERATION 4 : INVERSION

FIG. 9

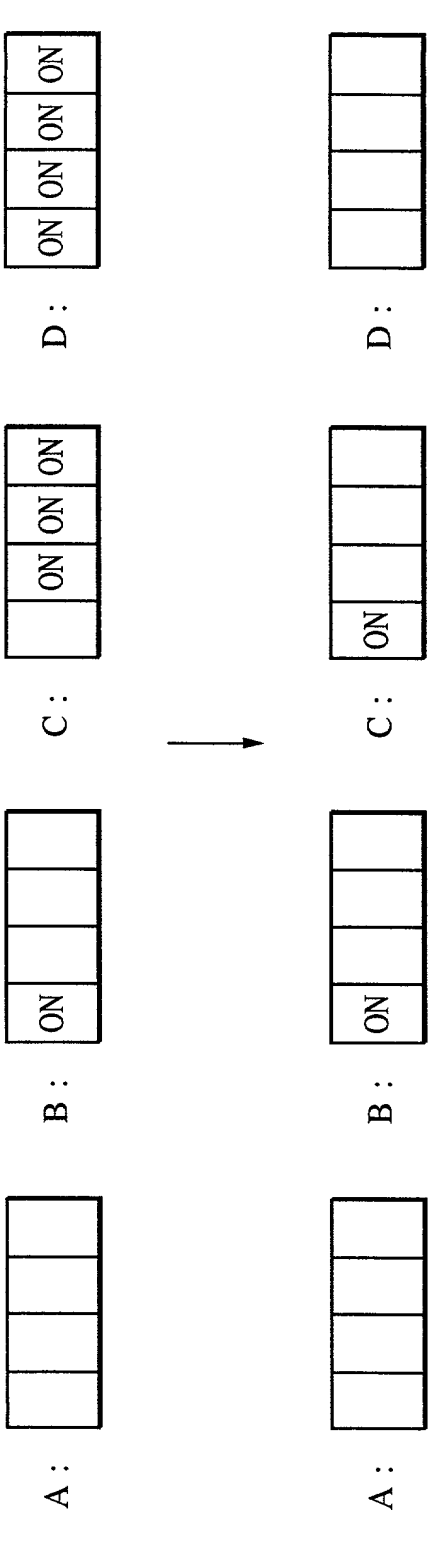


FIG. 10

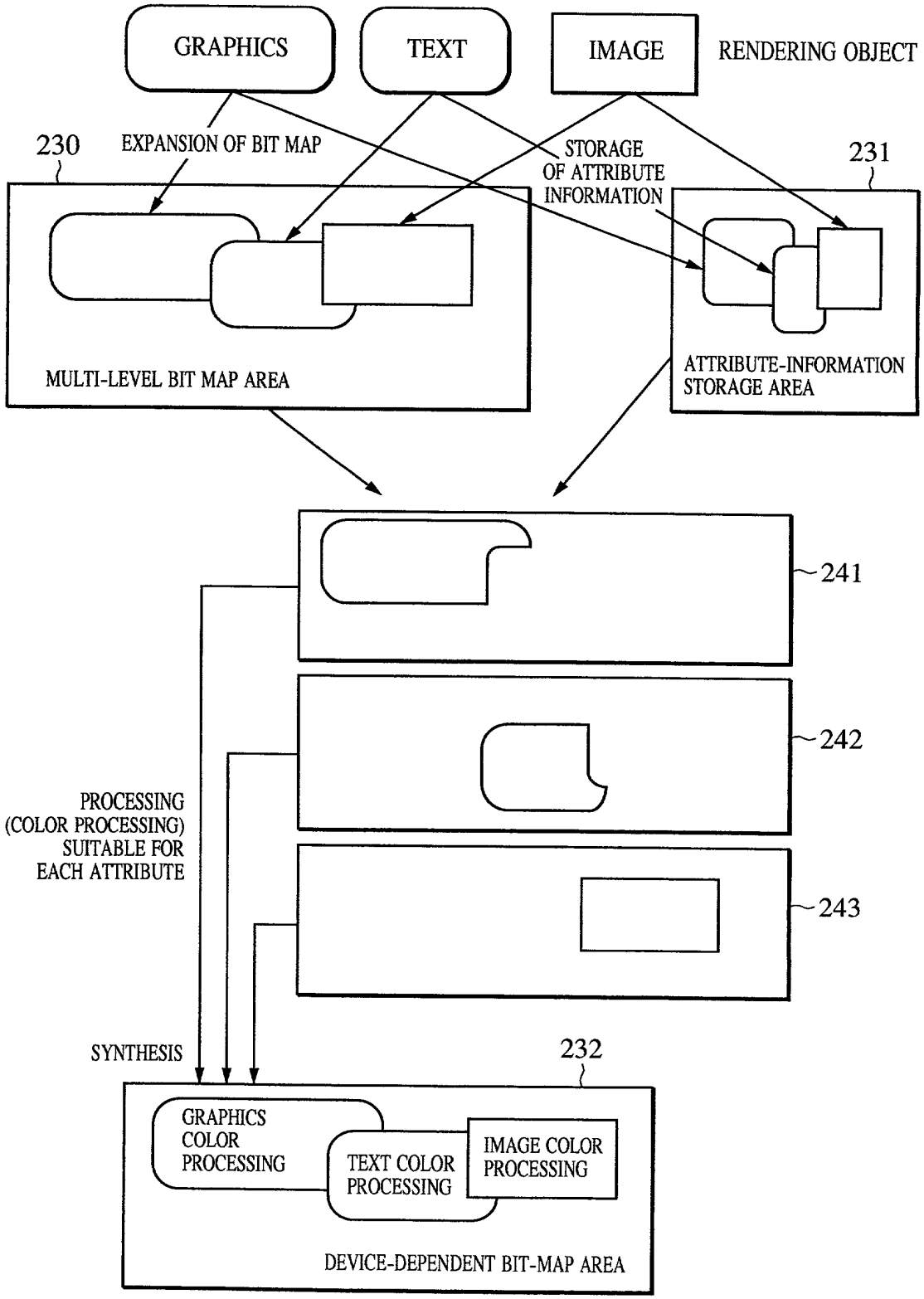

GRAPHICS
TEXT
IMAGE
RENDERING OBJECT
230
EXPANSION OF BIT MAP
STORAGE OF ATTRIBUTE INFORMATION
231
MULTI-LEVEL BIT MAP AREA
ATTRIBUTE-INFORMATION STORAGE AREA
241
242
243
PROCESSING (COLOR PROCESSING) SUITABLE FOR EACH ATTRIBUTE
SYNTHESIS
232
GRAPHICS COLOR PROCESSING
TEXT COLOR PROCESSING
IMAGE COLOR PROCESSING
DEVICE-DEPENDENT BIT-MAP AREA

FIG. 11A

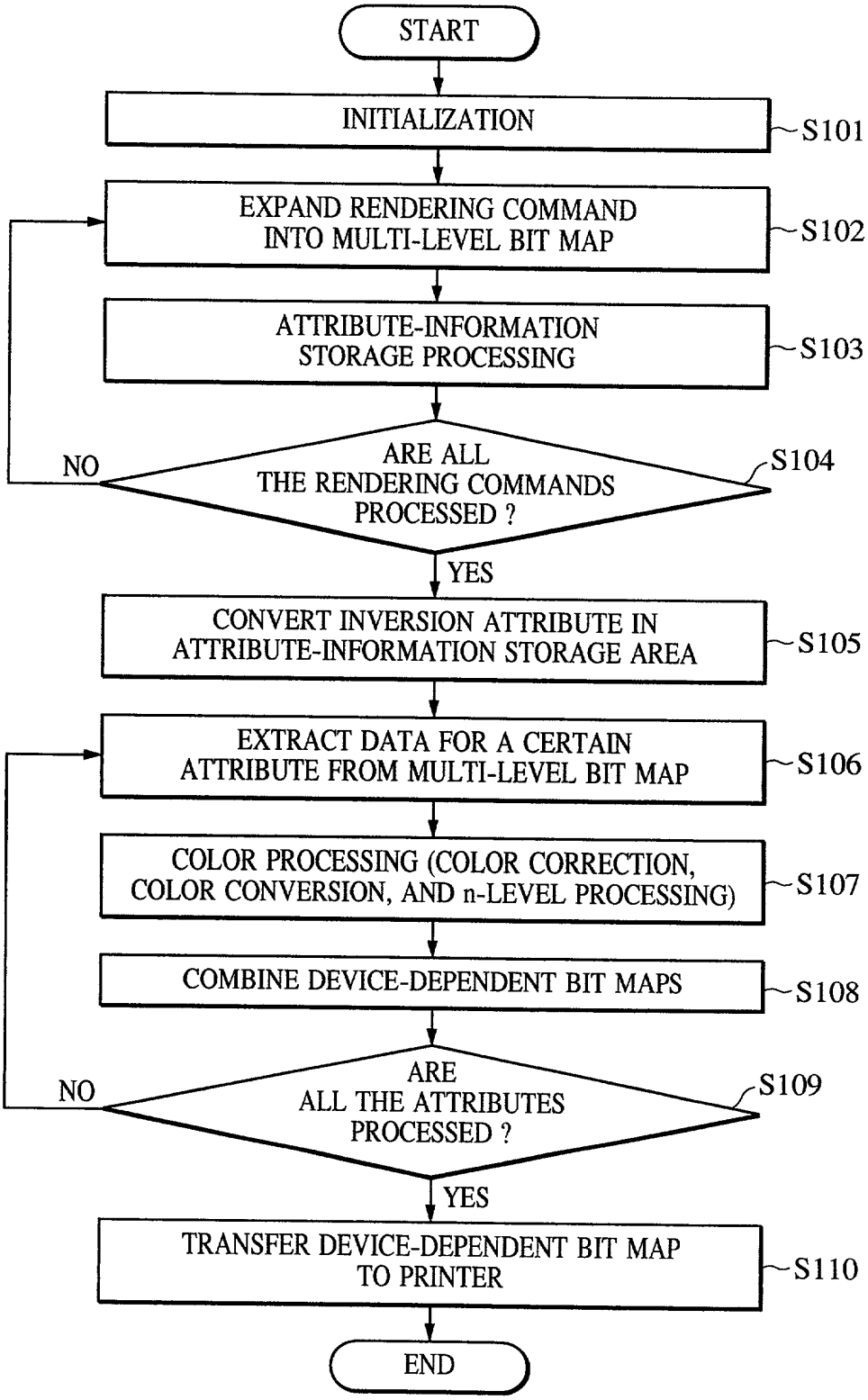

START
INITIALIZATION
S101
EXPAND RENDERING COMMAND INTO MULTI-LEVEL BIT MAP
S102
ATTRIBUTE-INFORMATION STORAGE PROCESSING
S103
ARE ALL THE RENDERING COMMANDS PROCESSED ?
S104
NO
YES
CONVERT INVERSION ATTRIBUTE IN ATTRIBUTE-INFORMATION STORAGE AREA
S105
EXTRACT DATA FOR A CERTAIN ATTRIBUTE FROM MULTI-LEVEL BIT MAP
S106
COLOR PROCESSING (COLOR CORRECTION, COLOR CONVERSION, AND n-LEVEL PROCESSING)
S107
COMBINE DEVICE-DEPENDENT BIT MAPS
S108
ARE ALL THE ATTRIBUTES PROCESSED ?
S109
NO
YES
TRANSFER DEVICE-DEPENDENT BIT MAP TO PRINTER
S110
END

FIG. 11B

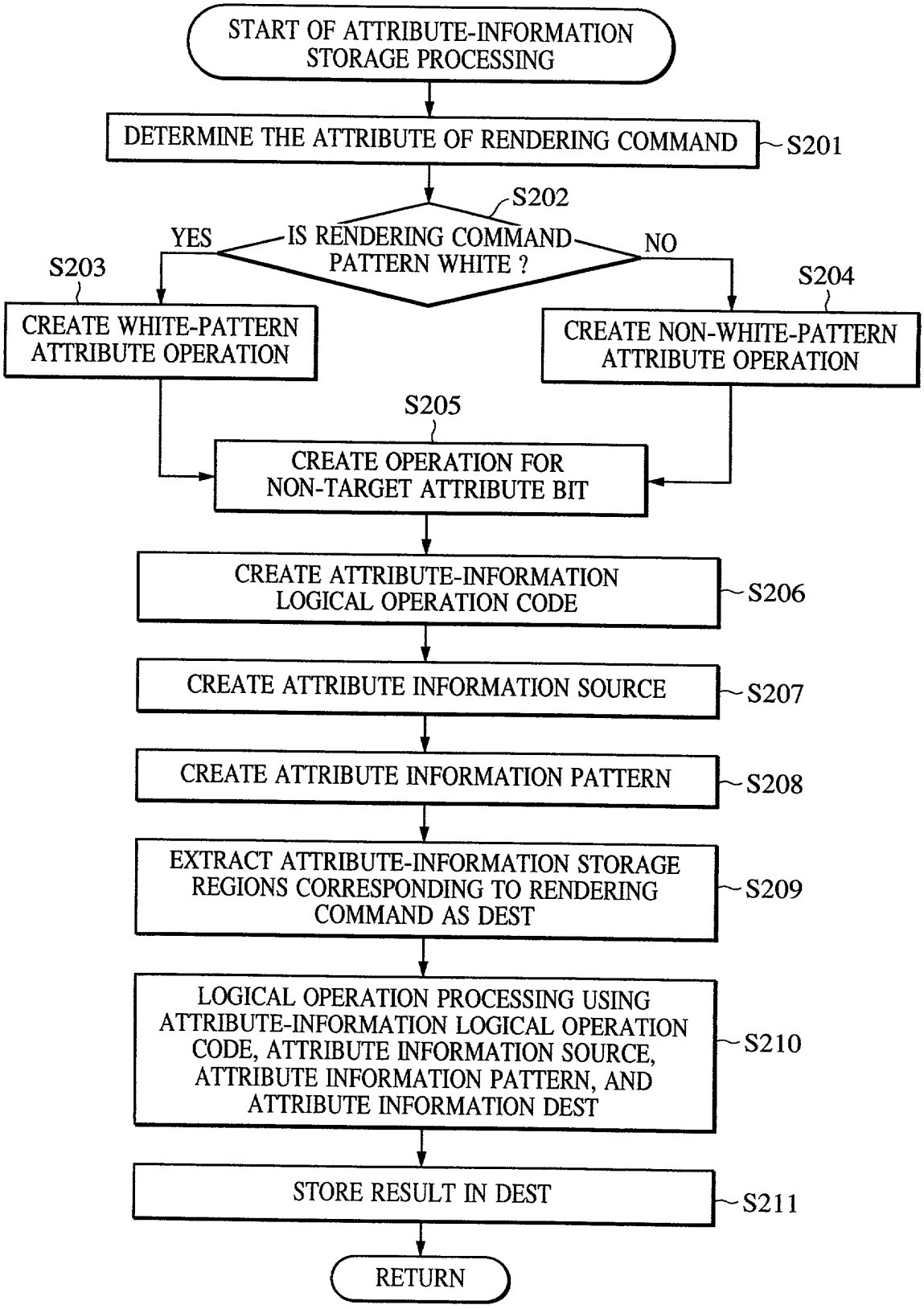

START OF ATTRIBUTE-INFORMATION STORAGE PROCESSING
DETERMINE THE ATTRIBUTE OF RENDERING COMMAND
S201
S202
IS RENDERING COMMAND PATTERN WHITE ?
YES
NO
S203
CREATE WHITE-PATTERN ATTRIBUTE OPERATION
S204
CREATE NON-WHITE-PATTERN ATTRIBUTE OPERATION
S205
CREATE OPERATION FOR NON-TARGET ATTRIBUTE BIT
CREATE ATTRIBUTE-INFORMATION LOGICAL OPERATION CODE
S206
CREATE ATTRIBUTE INFORMATION SOURCE
S207
CREATE ATTRIBUTE INFORMATION PATTERN
S208
EXTRACT ATTRIBUTE-INFORMATION STORAGE REGIONS CORRESPONDING TO RENDERING COMMAND AS DEST
S209
LOGICAL OPERATION PROCESSING USING ATTRIBUTE-INFORMATION LOGICAL OPERATION CODE, ATTRIBUTE INFORMATION SOURCE, ATTRIBUTE INFORMATION PATTERN, AND ATTRIBUTE INFORMATION DEST
S210
STORE RESULT IN DEST
S211
RETURN

FIG. 12

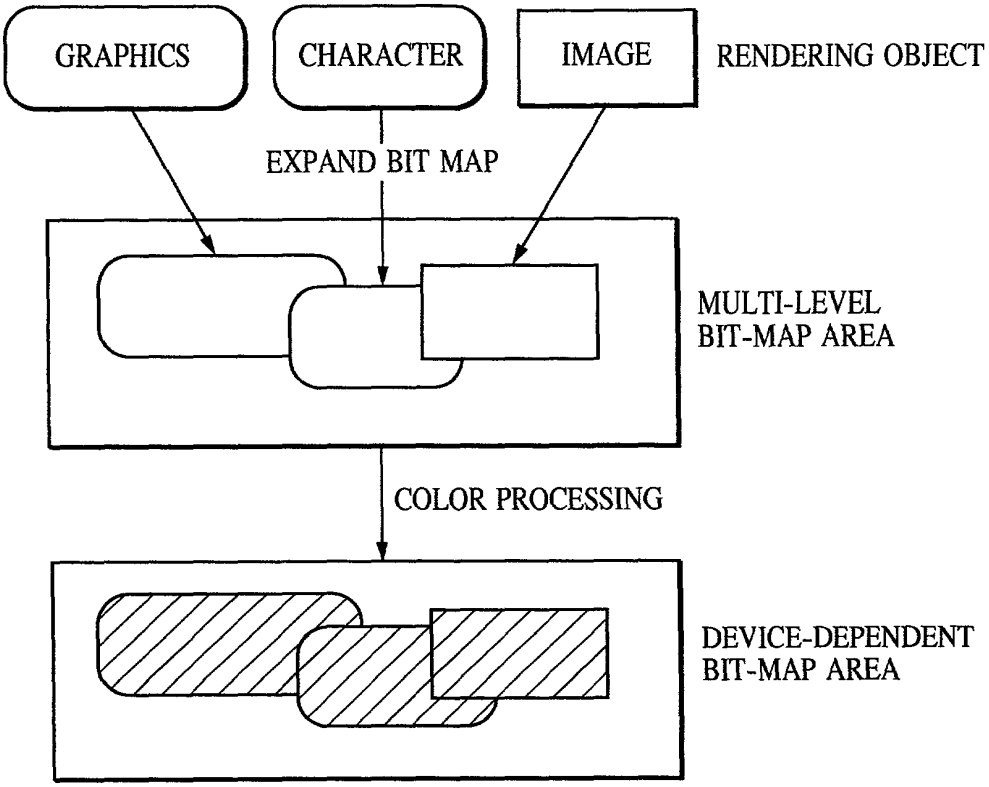

GRAPHICS
CHARACTER
IMAGE
RENDERING OBJECT
EXPAND BIT MAP
MULTI-LEVEL
BIT-MAP AREA
COLOR PROCESSING
DEVICE-DEPENDENT
BIT-MAP AREA

FIG. 13

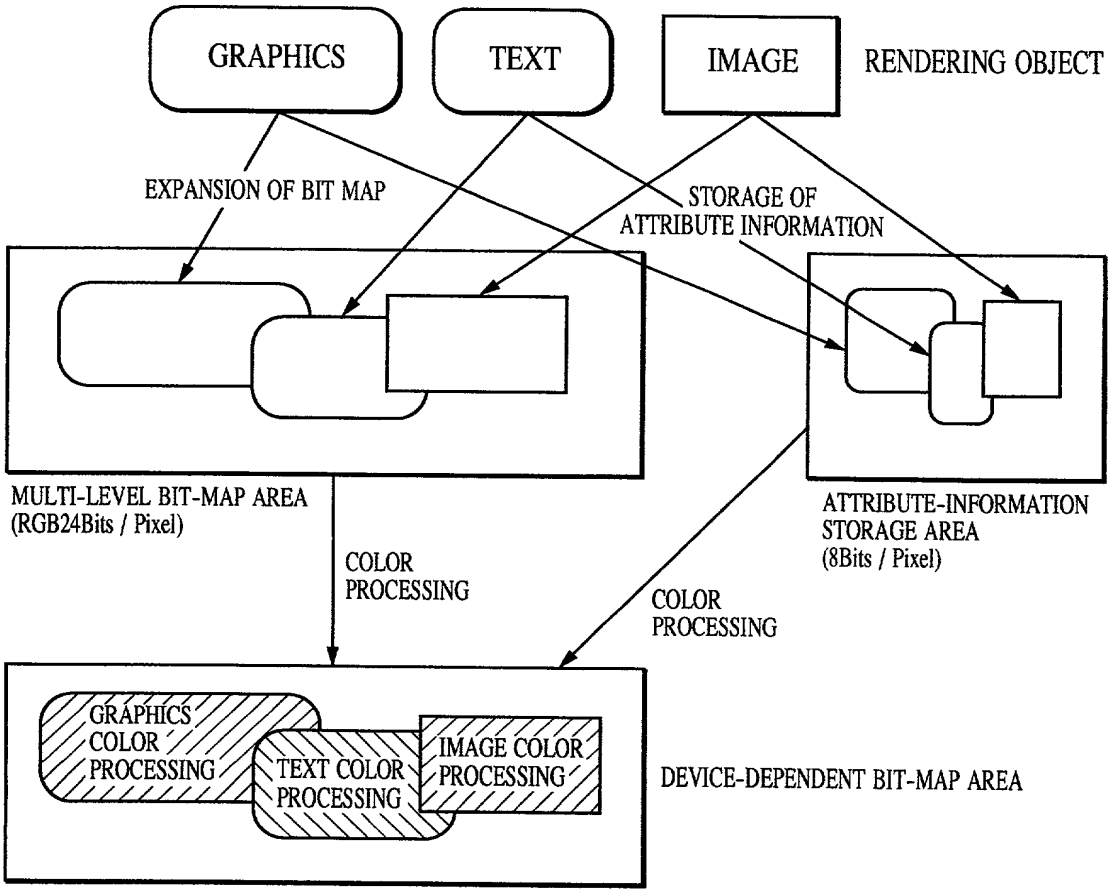
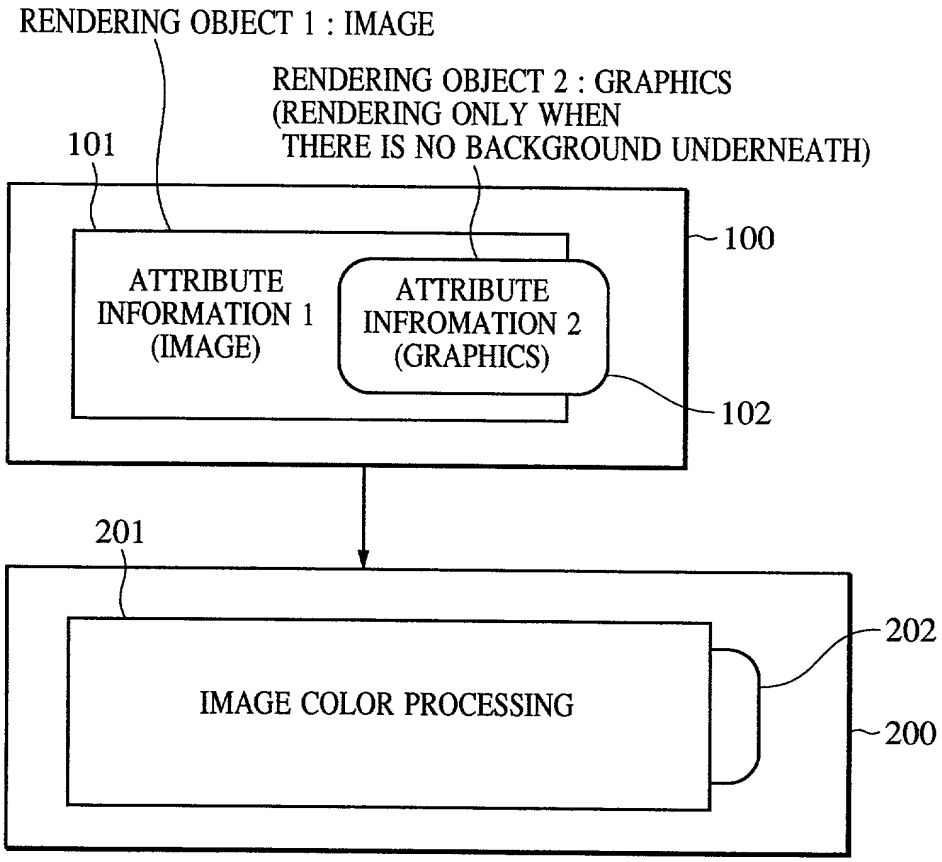

GRAPHICS
TEXT
IMAGE
RENDERING OBJECT
EXPANSION OF BIT MAP
STORAGE OF
ATTRIBUTE INFORMATION
MULTI-LEVEL BIT-MAP AREA
(RGB24Bits / Pixel)
ATTRIBUTE-INFORMATION
STORAGE AREA
(8Bits / Pixel)
COLOR
PROCESSING
COLOR
PROCESSING
GRAPHICS
COLOR
PROCESSING
TEXT COLOR
PROCESSING
IMAGE COLOR
PROCESSING
DEVICE-DEPENDENT BIT-MAP AREA

FIG. 14


RENDERING OBJECT 1 : IMAGE
RENDERING OBJECT 2 : GRAPHICS
(RENDERING ONLY WHEN
THERE IS NO BACKGROUND UNDERNEATH)
101
100
ATTRIBUTE
INFORMATION 1
(IMAGE)
ATTRIBUTE
INFROMATION 2
(GRAPHICS)
102
201
202
IMAGE COLOR PROCESSING
200